the faultiness of the original design or pattern is not glossed over by an engraver. It is a great pity that the magnificent collections in the British Museum cannot be rendered available for home study by the publication of similar photographs.

It is to be regretted that Dr. Meyer confined his account of the masks to those contained in the Dresden Museum, and has not compared these with the specimens which are to be found in other museums.

A good opportunity for a thorough treatment of the subject has thus been lost. For example, allusion is made to the occurrence of masks in the Elema district of the Papuan Gulf, but no description or figure is given of them, although numerous specimens of these have found their way into museums. Of the eight masks which are figured from Torres Straits, one of the most characteristic varieties is unrepresented—that one which represents a crocodile's head surmounted by a human face. A fret pattern occurs on a mask from Jervis Island. This is alluded to by Dr. Meyer, and is compared with somewhat similar patterns, of which woodcuts are given, on two masks from German New Guinea, and with two patterns on arrows from Dutch New Guinea. The Torres Straits pattern, unlike the others, is precisely similar to the common form of the pattern, and as it does not occur on other objects from that district we can only conclude, contrary to Dr. Meyer, that it was directly copied from some introduced object; the same mask is further ornamented with some imported red woven material. Dr. Meyer suggests that the helmet masks from New Ireland, and the feather helmets and masks from the Sandwich Islands, are reminiscences of the helmets of the Spanish voyagers of the sixteenth or seventeenth century. He also considers it probable that the use of masks in this part of the world originated in New Ireland, and extended through New Hebrides to the northern portion of the German territory of New Guinea, and thence by an overland route to the head of the Papuan Gulf and Torres Straits. Other routes were northward to the Caroline Island, Mortlock, and south-east to New Caledonia Dr. Meyer has been able to discover very little concerning the uses of masks; all that he can say is that they are used in "masquerades, festivals, general feasts, secular, religious, and war dances." It is, however, very probable that particular kinds of masks are used for definite occasions, and that the masks which are worn say during initiation ceremonies could not be put on at a seasonal festival. There is no evidence, so far as British New Guinea is concerned, that masks are ever worn at the festive or secular dance, or at the war dance; they appear to have a definite sacred or religious significance.

This valuable memoir concludes with an interesting quotation from Weisser's paper on masks from New Ireland. Early in May the men of one village repair to another village with which they have a feud. Each man then puts on the mask which he has been secretly preparing during the previous year, and the men of the one village dance opposite to those from the other. After this they have a feast, and exchange sago cakes, which they eat with caution, fearing poison; criticism of the masks of the opposite faction affords ample opportunity for the continuance of the animosity.

A. C. H.

OUR BOOK SHELF.

Larva Collecting and Breeding. By the Rev. J. Seymour St. John, B.A. (London: William Wesley and Son, 1890.)

THE alternative title of this little volume, which is of convenient size for the pocket, is "a hand-book to the larvæ of the British Macro-Lepidoptera and their food plants; both in nature and in confinement, with authorities," and is sufficiently explanatory of its scope and objects. The arrangement of the first portion of the book is entomological, of the second and concluding portion botanical. In the former the larvæ are arranged and named according to "The Entomologist Synonymic List of British Lepidoptera," and the food plants are enumerated as subsidiary to these. In the second half the food plants are specified in the order of the "London Catalogue of British Plants" (eighth edition). The book is therefore susceptible of a twofold use; it will induce the entomologist to become a field botanist, and conversely it will greatly aid the student who has some knowledge of the native flora in his efforts to become practically acquainted with the lepidopterous larvæ. So much energy is misdirected, particularly by young people, in making collections of butterflies and moths for the mere sake of collecting, that the intelligent use of this little book is calculated to effect a salutary change. It will, at least, direct greater attention to the life-histories of the Lepidoptera, and if it should be instrumental in inducing the collector to preserve and mount the larva alongside the male and female specimens of the mature butterfly or moth, so much the better. It is too common a practice to ignore the "grub" as unlovely and despicable; though from an economic point of view it possesses a higher interest than the winged insect, and is certainly not inferior to it in importance from a scientific standpoint. Nearly all the Lepidoptera which are familiar in this country as crop-pests are actively injurious only in the larval stage.

As the author intimates, such a work as this is necessarily a compilation, and, from its very nature, it is hardly possible to make it exhaustive. All who use it in the field will find opportunities to annotate and amplify it, and possibly to suggest emendations. The common names as well as the systematic names of the plants are given, and it might be useful if in a future edition the common names of the insects were, as far as possible, also enumerated. A few misprints have escaped notice, as *Galium sexatile* (p. 103), and *Rynchospora alba* (p. 137).

Mr. St. John's book represents a good idea well carried out, and it should have the effect of stimulating the study of natural history in the field.

Practical Chemistry for Medical Students. By Samuel Rideal, D.Sc. (Lond.), F.I.C., F.C.S., F.G.S. (London: H. K. Lewis, 1890.)

THIS book is intended by the author to embody the tests for those substances which a medical student is required to identify at the first examination of the Conjoint Examining Board in England. The attempt to compress this information into 53 small pages has resulted, as might have been expected under the circumstances, in a cram-book. Indeed, the only justification, if such it can be called, for the addition of another to the many works on qualitative analysis is that the book contains in the minimum space the knowledge required for a special examination. This knowledge is, however, frequently of a questionable nature. Thus, "calcium sulphate, $CaSO_4$ (*gypsum*)," is described as a "white *amorphous powder*;" "sodium carbonate, Na_2CO_3," as a "white solid, crystalline *or* amorphous;" "ferric chloride, Fe_2Cl_6, a yellow amorphous *powder*," and so forth: statements of a kind which, although they constitute a large portion of the book, are both fragmentary and inaccurate. The endeavour to

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attach valency values to the metals is carried out in all cases with the exception of iron, to which no value is affixed. The reason for this omission is not obvious, as the author does not hesitate to call lead a dyad, antimony a triad, &c. Amongst minor points the use of potassium antimony tartrate for potassium antimonyl tartrate, of arsenic acid for arsenic pentoxide, may be noticed.

The book may go some way to fulfil the author's expectation that it will give the student "some acquaintance with the art of test-tubing," but that it will materially increase his knowledge of the principles of practical chemistry, or sharpen his appreciation of the *raison d'être* of a chemical process, is another matter.

Manual of Pharmaceutical Testing. By Barnard S. Proctor, F.I.C. Pp. vii., 176. (London: *The Chemist and Druggist*, 1890.)

THIS book is a collection of tests suitable for ascertaining the purity of the chemicals of the British Pharmacopœia, &c. The tests described are the simplest possible, and can be carried out with the apparatus and chemicals in use at the dispensing counter. They apply more especially to the impurities of manufacture than to adulterations. In many cases they are simply those recommended by the British Pharmacopœia for determining if the purity of a material falls short of the required standard. As a rule they are qualitative, and sufficiently accurate for the purpose in view, although quantitative methods, more especially in determinations of solubility, or fixed residues of volatile liquids, are employed. The book contains a chapter on manipulation, which includes the method of weighing precipitates, and an index, and will be found a handy volume to the pharmacist.

The Encyclopædia of Photography. By Walter E. Woodbury. (London: Iliffe and Son, 1890.)

THIS work, which will be concluded in about twelve parts, is written on the same lines as other photographic encyclopædias, but treats especially of the sciences of optics and chemistry. The art of photography being so largely practised nowadays, it is curious what a small percentage of those who have taken it up know anything about optics or chemistry, which form the basis of the whole subject.

Throughout the book the author has borne this well in mind, and has spared no pains to place before the reader, in a simple and clear manner, the principles underlying the formation of images, the construction of lenses, chromatic and spherical aberration, the theory of atoms and molecules, and many other very important points relating to optics and chemistry.

The illustrations, which will be about 200 in number, consisting of explanatory sketches and diagrams, will be found, if up to the standard maintained in this first part, to serve their purpose well.

For amateurs this encyclopædia should be very useful, as it is written especially for beginners, and some of the most complicated terms likely to lead to confusion are avoided as much as possible.

Dynamics for Beginners. By the Rev. J. B. Lock, M.A. Third Edition, stereotyped. (London: Macmillan and Co., 1890.)

THE author has fully succeeded in supplying the want that has been long felt, of a book which should explain the elementary principles of dynamics, illustrating them by easy examples in a manner suitable for use in schools with boys of ordinary mathematical attainments.

Section I. deals with rectilinear dynamics, in which the fundamental principles are explained. The words "velo" and "celo," abbreviations for unit velocity and unit acceleration respectively, are here used, and the author says in the preface, "Of their value for the purposes of teaching and explanation I have received the very strongest testimony from those best qualified to judge."

Sections II. and III. treat of "Direction" and "Illustrations," the former dealing with the parallelograms of distances, velocities, and accelerations, chords of quickest descent, &c., the latter with projectiles, oblique impact, relative motion, hodograph, &c.

Work, energy, power, are discussed in Section IV., and there is a chapter on the indestructibility of matter.

An excellent set of examples is collected at the end, and a series of examination papers is added, taken from the various examinations held from time to time at Oxford and Cambridge.

LETTERS TO THE EDITOR.

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"The Climates of Past Ages."

I FEEL somewhat disappointed not to see a flood of correspondence in your pages arising out of Dr. Neumayr's very interesting lecture on the climates of past ages. The subject is difficult and complex, and the factors of the problem are no doubt various and of different kinds. I wish to make a few remarks on some of these.

It seems impossible to doubt that the sun is losing heat; and, consequently, that the quantity of heat annually received by the earth from the sun is less than it once was. Now, one of the most remarkable of the facts before us is the evidence, from fossil vegetation, of comparatively warm climates in the polar regions. There is no similar evidence respecting the equatorial regions; but it is probably impossible that such evidence should be preserved, so that its absence proves nothing as to the equatorial climate of the same period; but it is worth noticing that, if we suppose the force of solar radiation increased, the increase of terrestrial temperatures will be greater in high than in low latitudes, because, with the increased quantity of heat received into the atmosphere, an increased quantity will become latent by evaporation in the lower latitudes, and will be carried to the higher latitudes by vapour-bearing winds.

If our planet had neither atmosphere nor ocean, the temperature of the higher latitudes could be raised only as a direct result of increased solar radiation. If it had an atmosphere but no ocean, the increase of the temperature of the higher latitudes would be assisted by heat-bearing winds; and this would be at the expense of the temperature of the lower latitudes, which would be lowered by the heat so carried away. In the actual case of our earth, with both atmosphere and ocean, this action will be greatly increased by the power of vapour-bearing winds to carry heat in the latent form, which again becomes sensible heat on the condensation of the vapour. This appears to show that a considerable increase of temperature might be produced in the higher latitudes by a comparatively small increase in the force of solar radiation.

Dr. Neumayr says that the cause of the glacial climate is quite unknown; and at the same time he asserts that both hemispheres—the northern and the southern—were glaciated at the same time. I dispute both of these opinions. I think Mr. Croll has shown the direction in which the explanation of the glacial climate is to be sought; and if this is so, the two hemispheres were not glaciated at the same time, but alternately.

If, during a glacial period, the northern and the southern hemispheres were each alternately glaciated for geologically short periods, this would account for the fact mentioned by Dr. Neumayr, that the glacial period appears not to have been continuous, but interrupted by periods of milder climate. Croll's theory accounts for this. His theory is, that glacial periods occur at those astronomical epochs when the eccentricity of the earth's orbit is at its greatest; and a glacial climate is produced in the two hemispheres alternately, according as the

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